

Review of Conflict Probe Assessment Team (CPAT) Data Reduction Analysis Tools

June 25, 2003

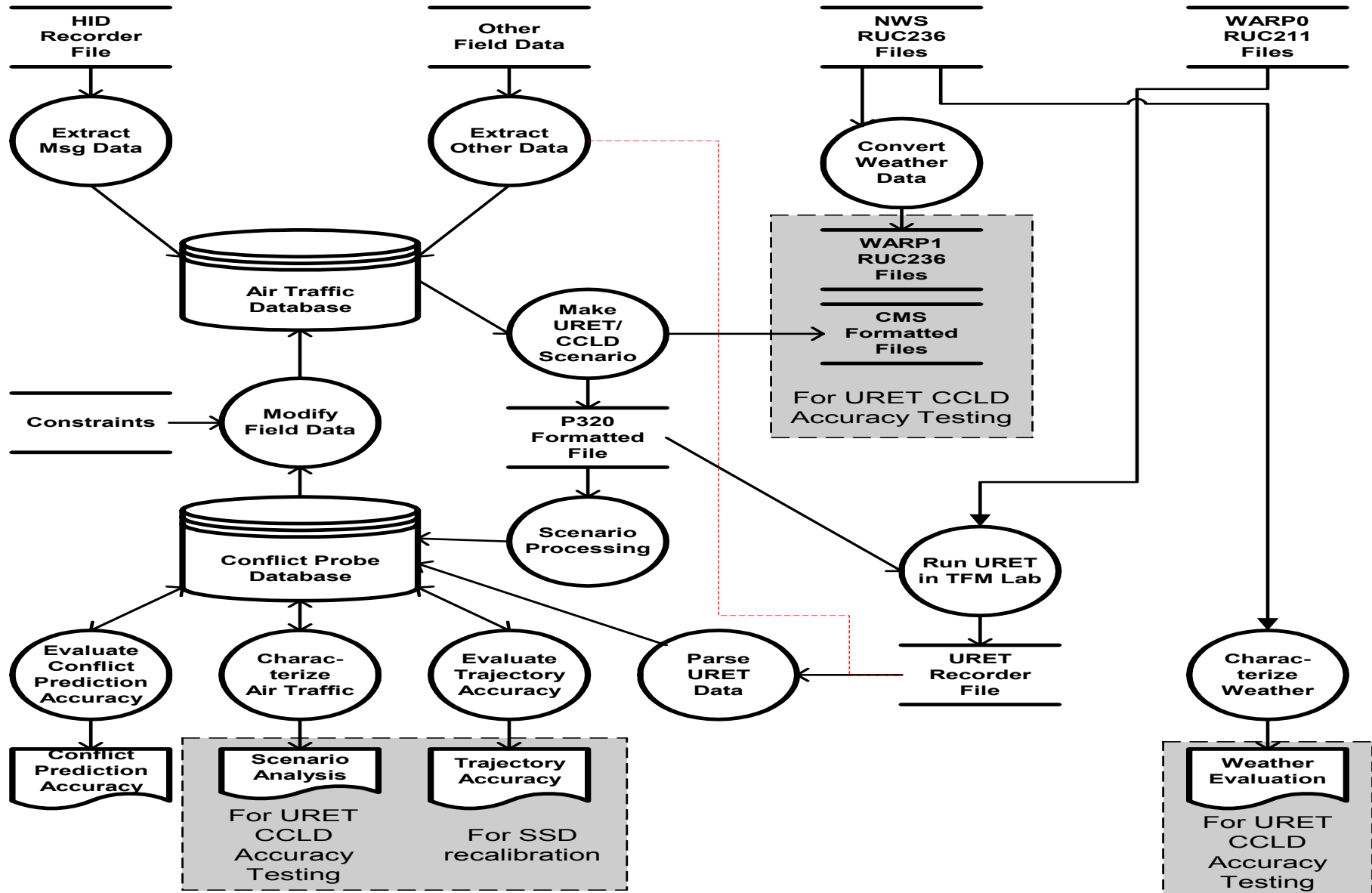
**Simulation and Analysis Group, ACB-330
Veridian IT Services**



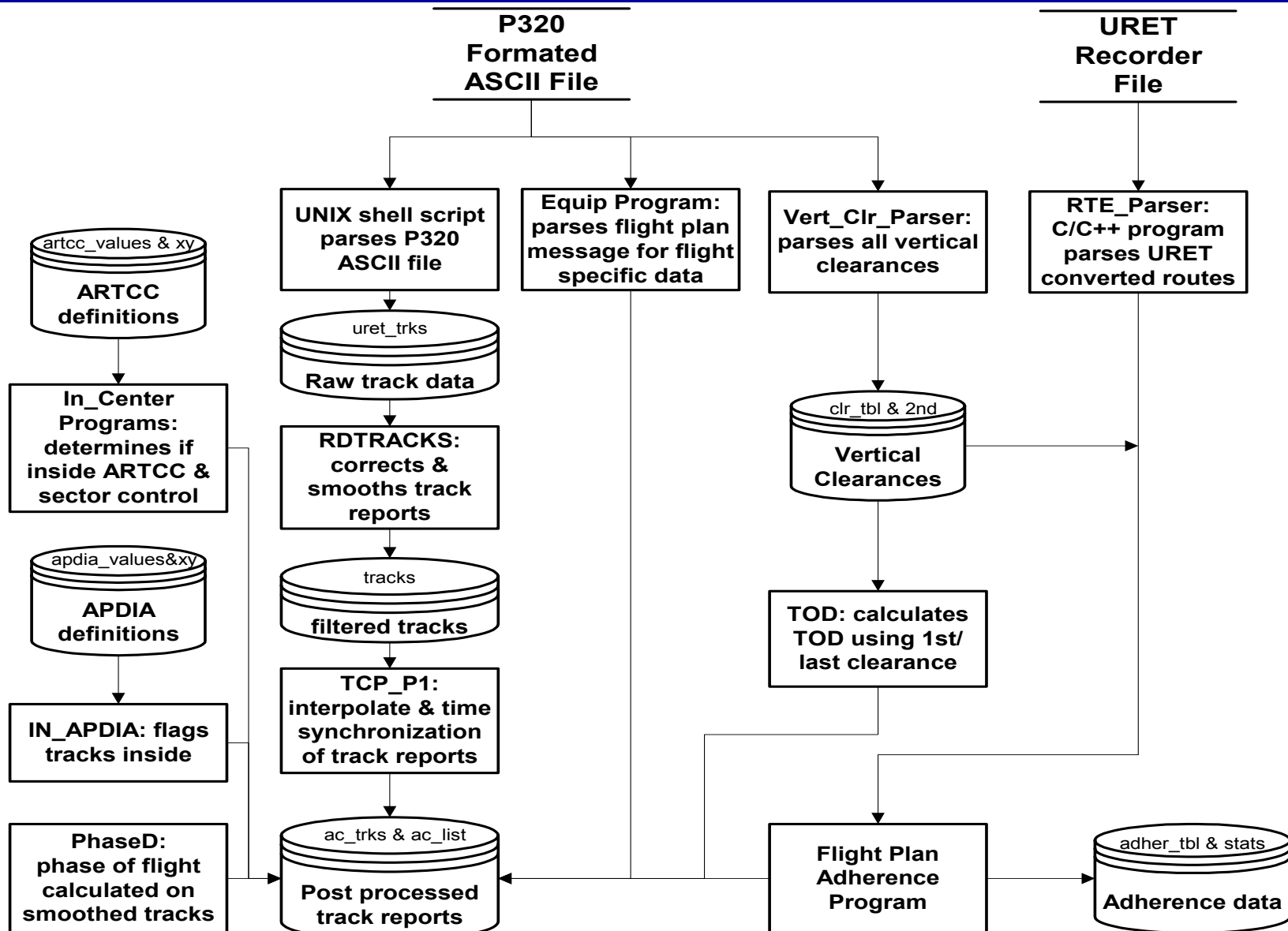
Briefing Overview

- **Review CPAT Tools**
 - **Trajectory Accuracy Tools**
 - **Conflict Prediction Accuracy Tools**
- **Adaptation Issues of Tools**
- **New Utilities**
- **Discussion**

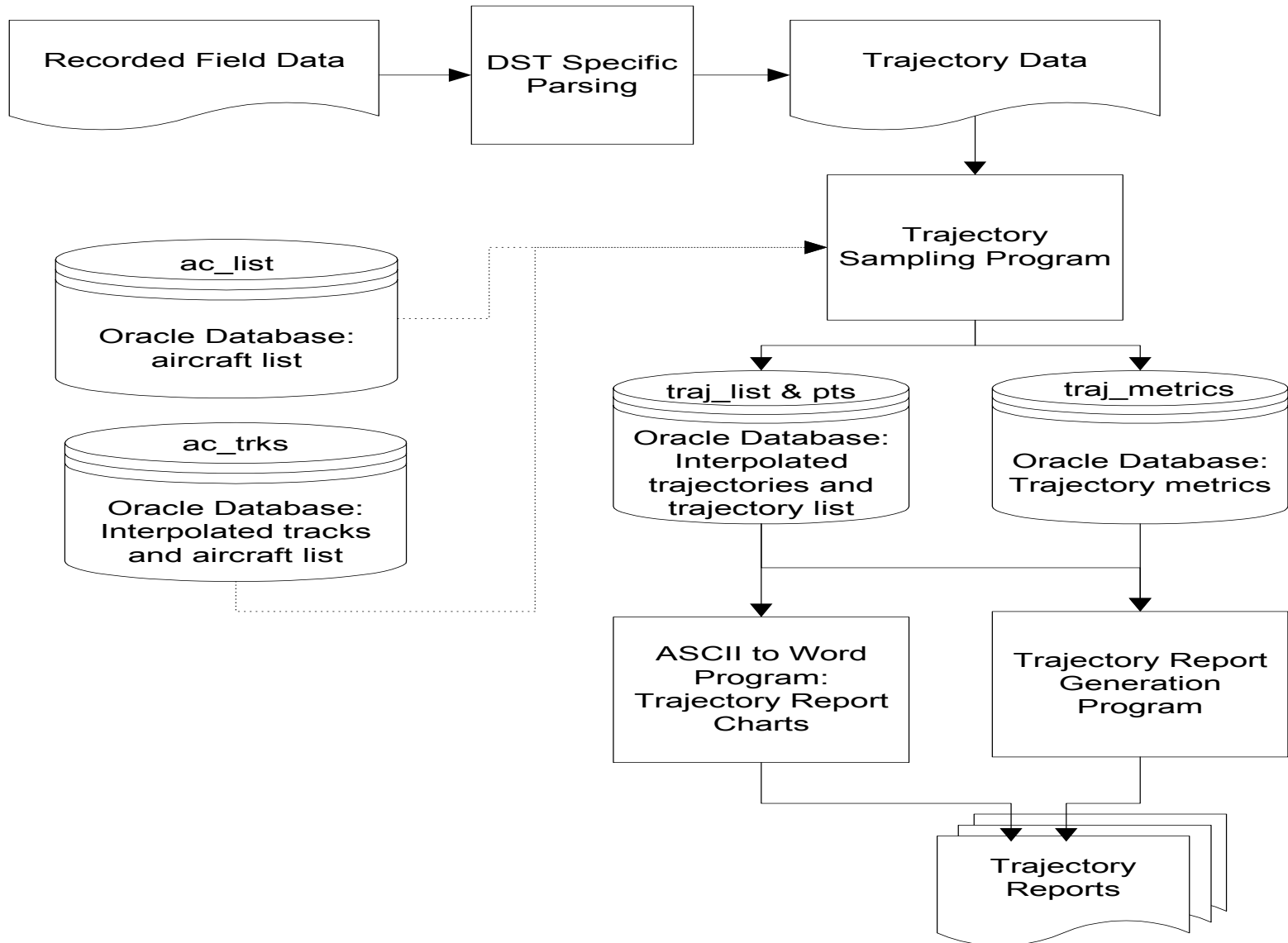
CPAT Accuracy Methodology & Tools



Scenario and URET Data Processing



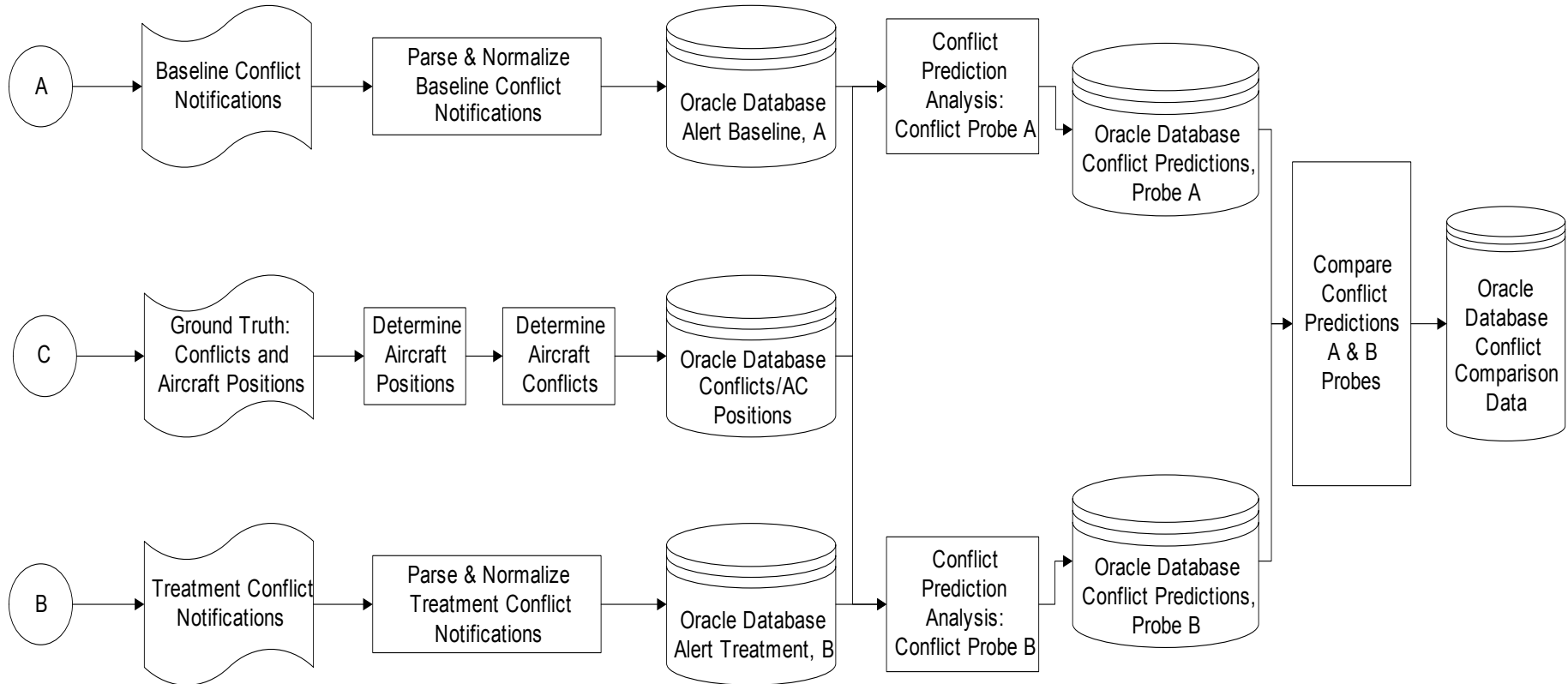
Trajectory Accuracy Processing



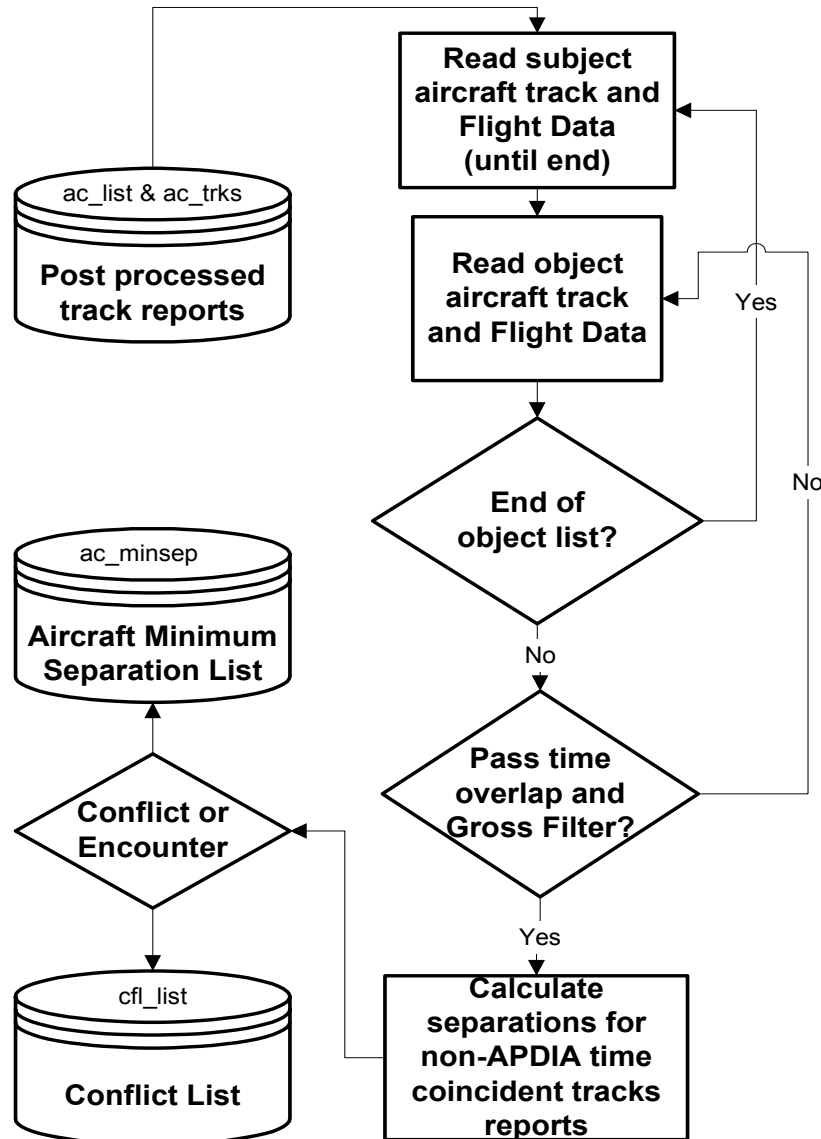
Trajectory Accuracy Regression

- **Make Baseline Run and Treatment Run**
- **Select measurements from traj_metrics table ordered by flight for each run**
- **Calculate differences between runs per flight**
- **Perform pairwise statistical analyses**
 - **parametric or non-parametric methods**
 - **version of this used in weather study**
- **Practical and proven method used in regression and risk reduction runs**

Conflict Prediction Accuracy



Determine Actual AC-AC Conflicts



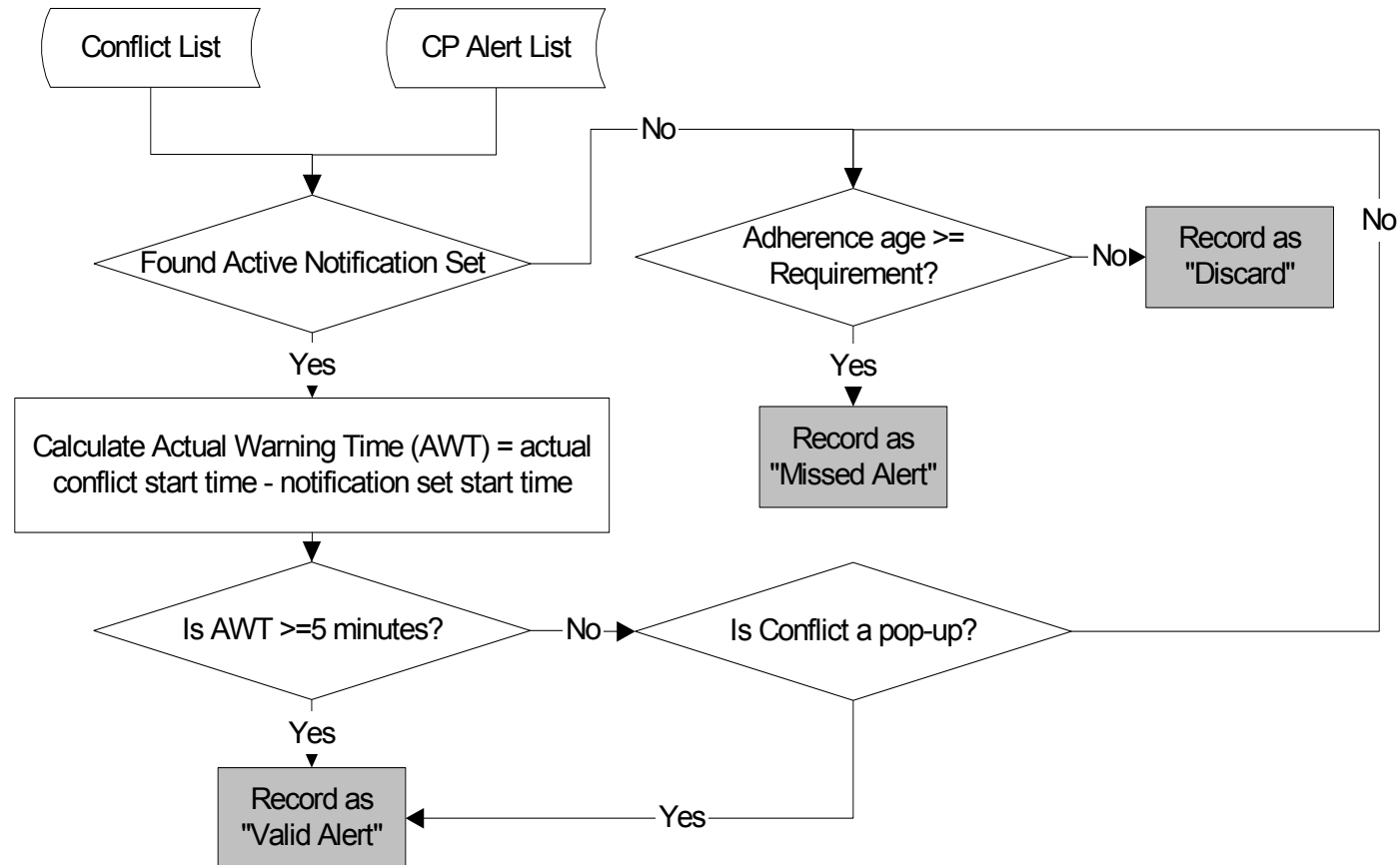
Design Considerations:

- **Beyond center control**
- **Exclude in APDIA**
- **Short duration cfl**
- **Multitple merge cfl**
- **Track gap during cfl**
- **<300 ft of cleared alt.**
- **Conflict attributes**
 - adherence age
 - popup codes
 - min. separations
 - vertical phase of flight
 - encounter angle

Conflict Prediction Accuracy

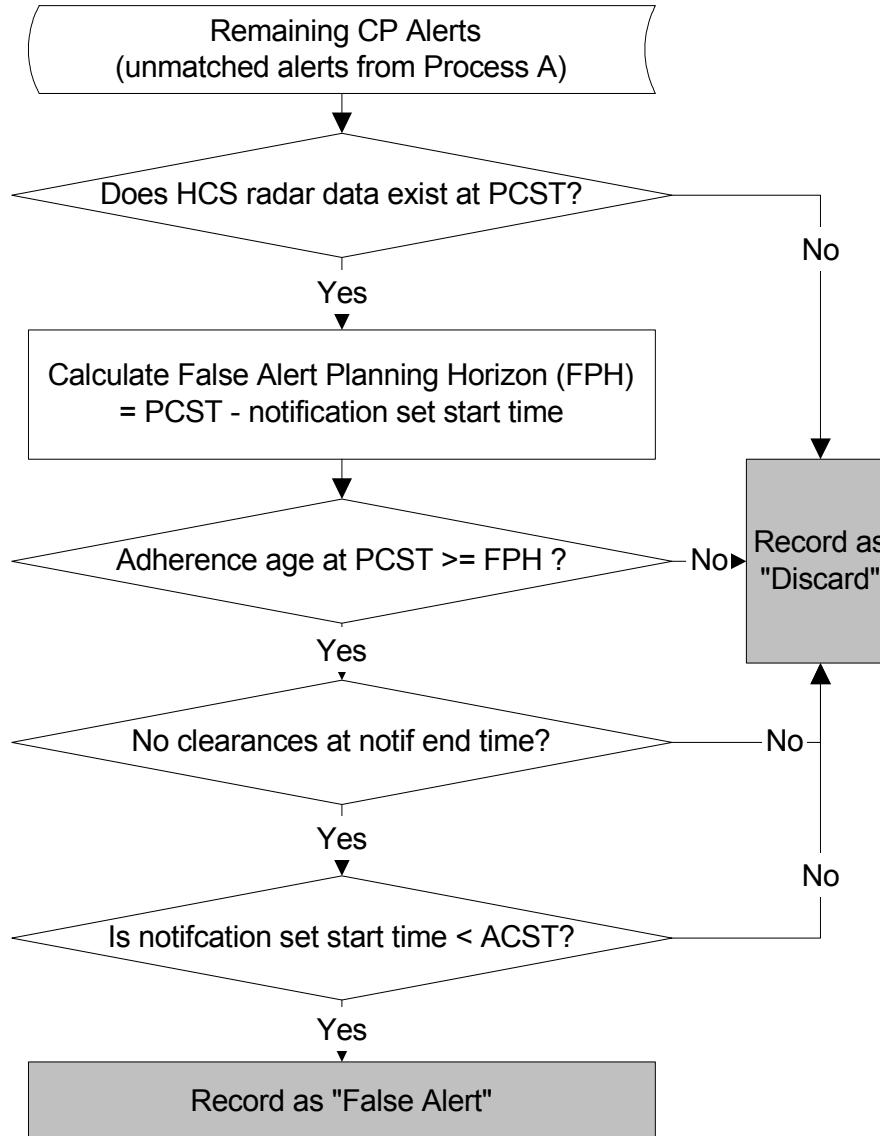
	CONFLICT OCCURS	CONFLICT DOES NOT OCCUR
ALERT	URET predicts conflict and it occurs (V -- valid alerts)	URET predicts conflict and it does not occur (F -- false alert)
NO ALERT	URET does not predict conflict and it occurs (M -- missed alert)	URET does not predict conflict and it does not occur (NC -- correct no-calls)
Totals	Total Number of Conflicts	Total Number of Non-Conflicts (Encounters that did not have conflicts)

Conflict Prediction Accuracy – Process A



Process A: Missed and Valid Alert Calculation

Conflict Prediction Accuracy – Process B



Process B:
False Alert
Calculation

All Reason Codes from Process A&B

REASON CODE	ALERT TYPE	REASON DESCRIPTION
STD_VA	Valid Alert	Standard Valid Alert
LATE_VA	Valid Alert	Late Valid Alert, Valid since conflict was determined a pop-up
NO_CALL_MA	Missed Alert	Missed Alert due to no call (no alert at all)
LATE_MA	Missed Alert	Late Missed Alert
NO_CALL_DISCARD	Discard Alert	Missed Alert no call discarded since out of adherence
LATE_DISCARD	Discard Alert	Late Discard since out of adherence
NO_TRK_FA_DISCARD	Discard Alert	No post processed track at predicted conflict start time so discard
NO_ADHER_FA_DISCARD	Discard Alert	Out of adherence at predicted conflict start time so discard
CLR_FA_DISCARD	Discard Alert	Retracted False Alert assigned by an ATC clearance so discard
CFL_FA_DISCARD	Discard Alert	False Alert notified beyond last conflict actual start time so discard
STD_FA	False Alert	Standard False Alert
RETRACT_FA	False Alert	Retracted False Alert, notification end time earlier than predicted conflict start time

Run Comparison of Conflict Predictions

	CONFLICT OCCURS	CONFLICT DOES NOT OCCUR
ALERT by both Runs A and B	Both predicts conflict and it occurs ($V_{A1}=V_{B1}$ -- valid alerts both)	Both predicts conflict and it does not occur ($F_{A1}=F_{B1}$ -- false alert both)
ALERT by A and not B	A predicts conflict and it occurs (V_{A2} -- valid alerts by A only) B does not predict conflict and it occurs (M_{B2} -- missed alert by B only)	A predicts conflict and it does not occur (F_{A2} -- false alert by A only) B does not predict conflict and it does not occur (NC_B -- correct no-calls by B only)
ALERT by B and not A	B predicts conflict and it occurs (V_{B2} -- valid alerts by B only) A does not predict conflict and it occurs (M_{A2} -- missed alert by A only)	B predicts conflict and it does not occur (F_{B2} -- false alert by B only) A does not predict conflict and it does not occur (NC_A -- correct no-calls by A only)
NO ALERT by both Runs A and B	Both do not predict conflict and it occurs ($M_{A1}=M_{B1}$ -- missed alert by both)	Both do not predict conflict and it does not occur (NC -- correct no-calls by both)
Total Number of Alerts for each/both	Total Number of Conflicts <i>(Same for both Runs!)</i>	Total Number of Non-Conflicts (Encounters that did not have conflicts; <i>Same for both Runs!)</i>

	CONFLICT OCCURS	CONFLICT DOES NOT OCCUR
ALERT by both Runs A and B	Both predicts conflict and it occurs ($V_{A1}=V_{B1}$ -- valid alerts both)	Both predicts conflict and it does not occur ($F_{A1}=F_{B1}$ -- false alert both)
ALERT by A and not B	A predicts conflict and it occurs (V_{A2} -- valid alerts by A only)	A predicts conflict and it does not occur (F_{A2} -- false alert by A only)
	B does not predict conflict and it occurs (M_{B2} -- missed alert by B only)	B does not predict conflict and it does not occur (NC_B -- correct no-calls/discards B only)
ALERT by A and B ALERT or non-ALERT is discarded	A predicts conflict and it occurs (V_{A3} -- valid alerts by A only)	A predicts conflict and it does not occur (** F_{A2} Continued **)
	B does not predict conflict correctly but is discarded (Discard _B -- B discards only)	B does not predict conflict correctly but is discarded (** NC_B Continued **)
ALERT by B and not A	B predicts conflict and it occurs (V_{B2} -- valid alerts by B only)	B predicts conflict and it does not occur (F_{B2} -- false alert by B only)
	A does not predict conflict and it occurs (M_{A2} -- missed alert by A only)	A does not predict conflict and it does not occur (NC_A -- correct no-calls/discards A only)
ALERT by B and A ALERT or non-ALERT is discarded	B predicts conflict and it occurs (V_{B3} -- valid alerts by B only)	B predicts conflict and it does not occur (** F_{B2} Continued **)
	A does not predict conflict correctly but is discarded (Discard _A -- A discards only)	A does not predict conflict correctly but is discarded (** NC_A Continued **)
NO ALERT by both Runs A and B	Both do not predict conflict and it occurs ($M_{A1}=M_{B1}$ -- missed alert by both)	Both do not predict conflict and it does not occur (NC -- correct no-calls by both)
Total Number of Alerts for each/both	Total Number of Conflicts (Same for both Runs!)	Total Number of Non-Conflicts (Encounters that did not have conflicts; Same for both Runs!)

Run Comparison Codes – In Table

Event	Evaluation Code	Description
V_{A1} or V_{B1}	SAME_VA	Both runs have valid alerts for the same conflict
M_{A1} or M_{B1}	SAME_MA	Both runs have missed alerts for the same conflict
F_{A1} or F_{B1}	SAME_FA	Both runs have false alerts for the same encounter
V_{A2} or M_{B2}	VA_MA	Run A has a valid alert and Run B has a missed alert for the same conflict
M_{A2} or V_{B2}	MA_VA	Run A has a missed alert and Run B has a valid alert for the same conflict
V_{A3} or Discard _B	VA_DISCARD	Run A has a valid alert while Run B discards the conflict
Discard _A or V_{B3}	DISCARD_VA	Run A discards the conflict while Run B has a valid alert
F_{A2} or NC _B	FA_NC	Run A has a false alert while Run B either has no prediction or discards the alert for the same encounter
NC _A or F_{B2}	NC_FA	Run A either has no prediction or discards the alert while Run B has a false alert for the same encounter

Adaptation Issues of CPAT DR&A Tools

- **Center Boundaries**
 - **Update script**
 - **Coordinates**
- **APDIAs**
- **SAAs – only for AS-conflicts**
- **Equip Program**
 - **Airport List (calc. of flight type)**
 - **Hard coded check of center id**

New Utilities

- **Table Name Script -- tn**

Table Name Script CVS : 1.8 \$

ERROR: Table Name Script requires parameters:

- 1) required field, the unique string (in capps) in Oracle table names
 - 2) optional field, default is null (no display),
y or Y if you want the table_name.dat file displayed
 - 3) optional field, default is either/both,
while string s for suffix and p for prefix
-

- **Archive Table Script – archive_tables**

Archive_tables Script, Version : 1.6 \$

ERROR: you entered incorrect script parameters!

Parameter 1: required, table string name

Parameter 2: optional, s for suffix or p for prefix table name string
